Indoor Air Quality - Testing Results

Customer Name: Test Customer	**Cartridge Barcode #** CRT10G2L1-0108J	**Report Issue Date** 08/26/2022 **Lab Testing Date** 05/16/2022	**Location Name** Master Bedroom	**Result Approved By** Not Approved
Beta Glucan Mold		Level	Result	pg/m3
Beta-Glucan (BG)				<167
Mold Genera (DNA)		Level	Result	SE/m3
Aspergillus			Normal/Minor	Not Detected
Penicillium			Normal/Minor	Not Detected
Stachybotrys			Normal/Minor	Not Detected
Fusarium			Normal/Minor	Not Detected
Trichoderma			Normal/Minor	Not Detected
Memnoniella			Normal/Minor	Not Detected
Chaetomium			Normal/Minor	Not Detected
Opportunistic Fungal Pathogens (DNA)		Level	Result	SE/m3
Candida albicans			---	---
Aspergillus niger			---	---
Aspergillus fumigatus			---	---
Mucor			---	---
Mycotoxin (RNA)		Level	Result	pg/m3
Trichothecene		Not Applicable	Not Detected	Not Detected
Ochratoxin		Not Applicable	Not Detected	Not Detected
Aflatoxin		Not Applicable	Not Detected	Not Detected

Fumonisin	Not Applicable	Not Detected	Not Detected
Allergens (Protein)	**Level**	**Result**	**pg/m3**
Dust Mite (Dust Mite)		---	---
Can f 1 (Dog Allergen)		---	---
Fel d 1 (Cat Allergen)		---	---
Mus m 1 (Mouse Allergen)		---	---
Bla g 2 (Roach Allergen)		---	---
Bet v 1 (Tree Pollen)		---	---
Phl p 5 (Grass Pollen)		---	---
Amb a 1 (Weed Pollen)		---	---

Contaminant Concentration Key Normal/Minor Low Moderate Severe	SE/m3 (spore equivalent per cubic meter) - "spore equivalent" refers to an estimate of the amount of genetic material found in 1 mold spore
(Contaminant Keys located on report pages 2 & 3)	Pg/m3 (picograms per cubic meter)

Testing Recommendations:

Company will store your sample for 60-days. Consider having your sample tested for Mold Genera, Mycotoxins, and Opportunisic Fungal Pathogens. If your client is sensitive to allergens, consider running an additional cartridge in their home for 5-days.

Key Report Notes and Definitons

Result:

All testing is provided by The Company.
Results relate only to the items tested.

Beta Glucan Mold & Allergens:

Beta Glucan Mold

Concentration is reported in the following units: pg/m3 (picograms/ cubic meter). LOD (limit of detection) is defined as 0.02 pg/m3 for 5-day runs, 0.09 pg/m3 for 1-day runs, and 2 pg/m3 for 1-hour runs. If reported (1→3) βeta Glucan Mold, value is above LOD, it is detectable. If the result is below LOD, it is reported as not detected. An end-point assay, based on the limulus protease activation pathway, is used to identify (1→3)-βeta Glucan Mold in each air sample.

Allergens
Concentration is reported in the following units: pg/m3 (picograms/ cubic meter). If reported allergen value is above LOD, it is detectable. If the result is below LOD, it is reported as ND (not detected). Allergens are tested using MARIA and ELISA.

Type of Testing	Component, Parameter or Characteristic Tested	LOD (Limit of Detection) pg/m3 5 Day Run
MARIA - Cat	Fel d 1	0.04
MARIA - Dog	Can f 1	0.08
ELISA - MOUSE	Mus m 1	0.04
MARIA - Roach	Bla g 2	0.18
ELISA - Dust Mite	Dust Mite	0.68
MARIA - Birch Pollen	Bet v 1	0.24
MARIA - Timothy Grass	Phl p 5	0.13
MARIA - Ragweed	Amb a 1	0.03
Mold- End-Point Assay	Beta-Glucan	0.02

Level: Data for allergens and/or (1→3)-β-D- glucan are presented as “undetected” if the level is below the detection level of the device or below LOD for the assay.

If the presence of allergens and/or (1→3)-β-D glucan is detectable, data is reported in terms of 3 levels (Low, Medium, High). Data from each assay is assigned to a range by comparing all customer data that has been collected by The Company. Levels change upon addition of new customer data. The levels are based entirely on environmental measurements and not on health effects.

Levels	Description
Normal/Minor	Result is below assay LOD (Limit of Detection)
Low	Result is at 33rd percentile or lower
Moderate	Result is between 33-66th percentile
Severe	Result is above 66th percentile

Mold Genera, Mycotoxins, and Opportunistic Fungal Pathogens: The presence of genera, mycotoxins, and opportunistic fungal pathogens are determined by qPCR, a quantitative polymerase chain reaction. Results for genera are reported in SE (spore equivalent)/cubic meter and mycotoxins are reported in pg/m3.

Result:

If reported value is above LOD, it is detectable. If the result is below LOD, it is reported as not detected.

	LOD (Limit of Detection) Copies per mL	LOD (Limit of Detection) SE/m3
Chaetomium	10	7.10E-05
Fusarium	10	1.54E-04
Memnoniella	10	5.47E-05
Penicillium	10	3.72E-05
Stachybotrys	5	2.34E-05
Trichoderma	5	2.06E-05
Aspergillus	5	2.39E-05

	LOD (Limit of Detection) Copies per mL	LOD (Limit of Detection) pg/m3
Aflatoxin	10	3.79E-05
Fumonisin	10	5.21E-05
Ochratoxin	10	3.79E-05
Tricothecene	10	4.02E-05

	LOD (Limit of Detection) Copies per mL	LOD (Limit of Detection) SE/m3
Aspergillus fumigatus	20	1.33E-04
Aspergillus niger	20	1.78E-04
Mucor	20	9.00E-05
Candida albicans	20	1.27E-04

Estimated Levels and Mold Genera Prevalence are based upon data accumulated and tables provided by Environmental Analysis Associates, Inc [1].

Levels	Description	Spores (cts/m3)	Aspergillus/ Penicillium	Zero Tolerance Molds
Normal/Minor	"Clean" non-HVAC supplied air	ND - 1,600	L	T
Normal/Minor	"Clean" HVAC supplied air	ND - 500	L	T
Low	Low- elevated, infiltration, positive growth	1,600- 13,000	C	L
Moderate	Atypical - Growth Likely	13,000-50,000	P	L
Severe	"Clean" non-HVAC supplied air	>50,000	P	C

P = predominant (can comprise ~80% of the spore distribution)
C = commonly occurring (can comprise ~50% of the spore distribution)
L = low (comprises <10% of the spore distribution)
T = trace (comprises <5% of the spore distribution)

1. Environmental Analysis Associates, Inc, Airborne and Surface Dust Analysis Interpretation Guide, 2020. P. 11-12.Currently, there are no standards defining levels of mycotoxins in the indoor air. This will be the first technology to identify airborne mycotoxin levels indoors. A customer database outlining Levels on indoor airborne mycotoxins will be available in the near future.

2. Zero Tolerance Molds: The following 5 molds are considered “Zero Tolerance” molds, as coined by the National Organization of Remediators and Microbial Inspectors (NORMI).

Product Overview:	Our high-volume air sampler is a whole-home approach for the capture of fine biological particles. The device has been optimized for the capture of airborne allergens, fungi, mycotoxins, viruses, and bacteria using electrokinetic capture (US patent numbers 8,038,944, 9,216,421, 9,360,402, 9,481,904, and 9,618,431) allowing for the capture of particles from 150 liters of air per minute[1]. 150 liters of air per minute travel through the device. The sampling device can capture the smaller more harmful particles that can get deep into the lungs. Through collaborative studies with Northwestern University, we have shown that the device has the capacity to capture fine particles as small as 0.1um[1]. Allergen particle size determines the site of respiratory contact and is critical for the determination of health outcomes. Particles larger than 10um enter through the nose and may induce allergic rhinitis. Particles from 4-10um in size deposit in the lower airways and may induce asthma, and particles <4um can reach the alveoli, deep into the lungs, and cause much more severe responses [2]. The air-sampling device has been validated in field studies through collaborations with The University of Chicagoand with Johns Hopkins School of Medicine. Correlation with reference methods in 58 home visits in Baltimore [3] and reference values for assessment of 100 homes in the Chicago area have been shown [4]. 1. Gordon, J., et al., A simple novel device for air sampling by electrokinetic capture. Microbiome, 2015. 3. 2. Raulf, M., et al., Monitoring of occupational and environmental aeroallergens - EAACI Position Paper Concerted action of the EAACI IG Occupational Allergy and Aerobiology & Air Pollution. Allergy, 2014. 69(10): p. 1280-1299. 3. Gordon, J., et al., Validation of a novel sampling technology for airborne allergens in low-income urban homes. Annals of Allergy Asthma & Immunology, 2018. 120(1): p. 96-+. 4. Gordon, J., et al., Bedroom exposure to airborne allergens in the Chicago area using a patient-operated sampling device. Annals of Allergy Asthma & Immunology, 2018. 121(2): p. 211-+
Beta Glucan Mold:	A vast majority of mold species have (1→3)-β-d-glucan as part of their cell walls, spores, and as particulate matter emitted into the air. The smaller particles are more likely to remain airborne longer and penetrate deep into the lungs. These smaller sized particles released into the air by germinating and growing fungi are selectively measured by proprietary assay. With one result, you receive the total exposure to fungal mass in your home environment. Levels of (1→3)-β-d-glucan in the air are known to correlate with fungal mass and severity of symptoms
Mold Genera:	**Aspergillus:** Commonly found in soil, decaying vegetation, and in house dust, the Aspergillus genus includes 185 species of mold. Aspergillus fumigatus is the most common cause of aspergillosis. Exposure can lead to severe infection in immunocompromised individuals. **Penicillium:** Associated with decaying food products, Penicillium includes over 300 species of mold. Penicillium can be found on cellulose materials inside homes and buildings and can even grow in environments of relatively low humidity. **Zero Tolerance Molds: The following 5 molds are considered “Zero Tolerance” molds, as coined by the National Organization of Remediators and Microbial Inspectors (NORMI). These molds may be indicative of severe water damage and can be highly toxic to some individuals. If found, they require immediate remediation.** **Stachybotrys:** Stachybotrys includes roughly 50 species of mold and grows on products with high cellulose content, such as fiberboard, wood, and paper. The most notorious species, Stachybotrys chartarum, aka. black mold, is associated with moisture from water damage, leaks, or flooding. **Fusarium:** Found in the air, soil, and on plants, Fusarium includes 20 species of mold. Some species of Fusarium can cause mycotoxicosis and severe disease, if digested. Like Stachybotrys, Fusarium can be associated with severe water damage from leaks, broken pipes, and flooding.

Mold Genera:	**Trichoderma:** Trichoderma can be found in carpets, furniture, wallpaper, and wood, if moisture conditions are high enough. Some species of Trichoderma are more resistant to anti-fungal drugs than other molds, which poses a threat to immunocompromised individuals. **Memnoniella:** Memnoniella, a close relative of the infamous Stachybotrys molds, is a mold that commonly develops on water damaged construction material. Like Stachybotrys, Memnoniella grows on materials with cellulose content, in the presence of high moisture. **Chaetomium:** Most commonly found in decaying plants, animal dung, and in damp soil, Chaetomium includes 95 species of molds and can grow on water damaged materials with high cellulose content. Many species can cause severe respiratory disease in immunocompromised individuals.
Mycotoxins:	**Mycotoxins:** Mycotoxins are toxic environmental compounds produced by certain types of mold. According to the WHO (World Health Organization), mycotoxin exposure can pose serious health consequences to both humans and livestock. Health effects can range from acute poisoning to long-term effects such as immunodeficiencies and cancer. **Trichothecene:** Trichothecenes are produced by Trichoderma and Stachybotrys, such as Stachybotrys chartarum (black mold). **Ochratoxin:** Ochratoxins are produced by some Aspergillus and Penicillium species of mold, such as Aspergillus niger and Penicillium verrucosum. **Aflatoxin:** Aflatoxins are highly liver carcinogenic. They are mainly produced by some species of Aspergillus, such as Aspergillus flavus and Aspergillus parasiticus. **Fumonisins:** Fumonisins are environmental toxins produced by the molds Fusarium moniliforme (F. verticillioides), F. proliferatum, and other Fusarium species.
Opportunistic Fungal Pathogens:	**Opportunistic Fungal Pathogens:** Immunocompromised individuals have weakened immune systems. Due to age or to specific medical conditions, this population is left vulnerable to infection by the following panel of fungi: **Aspergillus fumigatus & Aspergillus niger:** Aspergillus fumigatus and Aspergillus niger are both common species of fungi in the genus, Aspergillus. Both types of fungi can cause disease in individuals with immunodeficiencies. Diseases associated with Aspergillus fumigatus include chronic pulmonary aspergillosis, invasive aspergillosis, a life-threatening disease which can infect multiple organs, pneumonitis, aspergilloma, allergic asthma, and hypersensitivity. In rare circumstances, Aspergillus niger can also cause aspergillosis. Otomycosis, a fungal ear infection, which causes severe pain, hearing loss, and damage to the ear canal, can also be attributed to Aspergillus niger infections. **Mucor:** Mucor is a genus of fungi which is comprised of approximately 40 species. Breathing in some species of Mucor can cause severe disease in immunocompromised individuals, known as mucormycosis. Mucormycosis is a severe and potentially fatal fungal infection starting in the sinuses or lungs. It is especially serious due to the fast-spreading nature of the infection. Without treatment, it can rapidly spread throughout the body. **Candida albicans:** Candida albicans is the most common species of yeast that is associated with infection in humans. In immunocompromised individuals, Candida can cause invasive candidiasis, a serious infection that can enter the bloodstream and infect internal organs. According to the Centers for Disease Control and Prevention, invasive candidiasis is one of the most common causes of bloodstream infections in hospitalized patients and can lead to long hospital stays and death.

Operations & Quality:	Company has 5 critical ISO certification for laboratory testing operations (ISO 17025), manufacturing excellence (ISO 13485), overall company quality processes and controls (ISO 9001), personnel occupational health and safety management system (ISO 45001), and best practices for protecting our environment (ISO 14001). ISO standards are internationally agreed by experts as a audited formula that describes the best way of doing something. Standards are the distilled wisdom of people with expertise in their subject matter and who know the needs of the organizations they represent people such as manufacturers, sellers, buyers, customers, trade associations, users or regulators.
University Research & Peer Reviewed	Our research is published in peer reviewed scientific journals and scientifically validated in hundreds of homes and other locations in collaboration with leading allergists, researchers, and institutions, including University of Chicago, Johns Hopkins, Harvard, Argonne National Laboratories, University of Nebraska, and Mobile Care Chicago. Upon registration, all literature is available on our website:

Key Report Notes and Definitons

the Company shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client.